

10 CSR 10-5.510 Control of Emissions of Nitrogen Oxides

(1) Applicability.

- (A) This rule shall apply to all installations located in the counties of Franklin, Jefferson, St. Charles and St. Louis and the City of St. Louis with the potential to emit one hundred (100) tons or greater per year of nitrogen oxides.
- (B) Installations affected by this rule shall be in compliance no later than May 1, 2002. The director may grant an extension of the compliance deadline if the affected installation submits an alternative compliance plan no later than January 1, 2001. The alternative compliance plan shall include the following items:
 - 1. For each affected unit, a detailed analysis of the air quality benefit that will occur if the compliance date is extended;
 - 2. For each affected unit, a detailed explanation of the reasons why the owner or operator believes that compliance with the applicable NO_x emissions limit by May 1, 2002 is impractical;
 - 3. Information sufficient to identify each affected unit;
 - 4. A proposed schedule setting dates by which the owner or operator will complete the following milestones for each affected unit; and
 - A. Applications for all necessary permits;
 - B. Contracts for the implementation of new units or control equipment;
 - C. Construction and installation of new units or control equipment; and
 - D. Compliance with the applicable NO_x emissions limitation established in this rule; and
 - 5. Any other information the director requests.

(C) Exemptions. The requirements of this rule shall not apply to the following emission units:

1. Any boiler having a maximum heat input of less than fifty (50) million British thermal units (mmBtu) per hour;
2. Any stationary internal combustion engine having a rated energy output capacity of less than five hundred (500) horsepower or a maximum heat input capacity of twenty (20) mmBtu per hour or less;
3. Any stationary combustion turbine having a rated maximum heat input capacity of less than twenty (20) mmBtu per hour;
4. Any emergency standby boiler, stationary internal combustion engine, stationary combustion turbine, start up unit, or black start unit which operates less than seven hundred and fifty (750) hours annually and less than four hundred (400) hours during ozone season;
5. Any research and development emissions unit;
6. Any jet engine test cell;
7. Any air pollution control device;
8. Any emission unit which is required to meet a more stringent state or federal NO_x emissions limitation;
9. Any unit that would otherwise be required to comply with this rule with actual annual NO_x emissions of thirty (30) tons per year or less. This exemption shall cease to apply to a unit if the unit ever exceeds thirty (30) tons per year of actual NO_x emissions for any calendar year. Any unit that becomes affected by this rule due to failure to maintain this exemption after January 1, 2000 shall immediately notify the department in writing that the rule applies. The unit shall be

in compliance with the applicable provisions of this rule within twenty four (24) months after notifying the department or May 1, 2002, whichever is later;

10. Any unit subject to and in compliance with Phase II acid rain requirements; and
11. Any incinerator having a maximum rated heat input capacity of less than fifty (50) mmBtu per hour.

(2) Definitions.

- (A) Black start unit—Any electric generating unit operated only in the event of a complete loss of power.
- (B) Cyclone boiler—A boiler with a horizontal, cylindrical furnace that burns crushed rather than pulverized coal.
- (C) Emergency standby boiler—A boiler operated during times of loss of primary power at the installation that is beyond the control of the owner or operator, during routine maintenance, to provide steam for building heat; or to protect essential equipment.
- (D) Emergency stationary internal combustion engine—A stationary internal combustion engine used to drive pumps, aerators or other equipment only during times of loss of primary power at the facility that is beyond the control of the owner or operator of the facility or during routine maintenance.
- (E) Emergency stationary combustion turbine—A stationary combustion turbine operated only during times of loss of primary power at the facility that is beyond the control of the owner or operator of the facility or during routine maintenance.
- (F) Internal combustion engine—Any engine in which power, produced by heat and/or pressure developed in the engine cylinder(s) by burning a mixture of fuel and air, is subsequently converted to mechanical work by means of one or more pistons.

10 CSR 10-5.510

- (G) Jet engine test cell—A stationary jet engine used for the purpose of research and testing.
 - (H) Predictive emissions monitoring system (PEMS)—A system that uses process and other parameters as inputs to a computer program or other data reduction system to predict values in terms of the applicable emission limitation or standard.
 - (I) Research and development emissions unit—Any combustion unit operated only for the purpose of research and development work.
 - (J) Start-up unit—A unit operated only to start up larger electric generating units.
 - (K) Stationary internal combustion engine—Any internal combustion engine that is not self propelled, but which may be mounted on a vehicle for portability.
 - (L) Stoker boiler—A boiler design that employs a grate assembly to combust coal.
 - (M) Tangentially fired boiler—A boiler that has coal and air nozzles mounted in each corner of the furnace where the vertical furnace walls meet. Both pulverized coal and air are directed from the furnace corners along a line tangential to a circle lying in a horizontal plane of the furnace.
 - (N) Wall fired boiler—A boiler that has pulverized coal burners arranged on the wall of the furnace. The burners have discrete, individual flames that extend perpendicularly into the furnace area.
 - (O) Definitions of certain terms specified in this rule, other than those specified in this rule section, may be found in 10 CSR 10-6.020.
- (3) General Provisions.
- (A) No owner or operator of a boiler with a maximum rated heat input capacity of one hundred (100) mmBtu per hour

or greater shall allow the unit to emit NO_x in excess of the emission rates specified in Table 1 as measured pursuant to section (5) of this rule.

Table 1
Maximum Allowable NO_x Emission Rates for Boilers
(Pounds of NO_x per mmBtu)

Fuel/Boiler Type	Firing Configurations			
	Tangential	Wall	Cyclone	Stoker
Gaseous Fuels Only	0.2	0.2	0.5	-
Distillate Oil	0.3	0.3	-	-
Residual Oil	0.3	0.3	-	-
Coal - Wet Bottom	-	-	0.86	-
Coal - Dry Bottom	0.45	0.5	-	0.5

(B) An owner or operator of a boiler or incinerator with a maximum rated heat input capacity equal to or greater than fifty (50) mmBtu per hour but less than one hundred (100) mmBtu per hour shall complete an annual adjustment or tune up on the combustion process. This adjustment or tune up shall include at a minimum the following items:

1. Inspection, adjustment, cleaning or replacement of fuel burning equipment, including the burners and moving parts necessary for proper operation as specified by the manufacturer;
2. Inspection of the flame pattern or characteristics and adjustments necessary to minimize total emissions of NO_x and, to the extent practicable, minimize emissions of carbon monoxide; and
3. Inspection of the air to fuel ratio control system and adjustments necessary to ensure proper calibration and operation as specified by the manufacturer.

(C) No owner or operator of a stationary combustion turbine shall allow or permit the discharge of any NO_x emissions in excess of the following limits:

1. Seventy-five (75) parts per million (ppm), corrected to fifteen percent (15%) oxygen, for combustion turbines firing gaseous fuel only; and
 2. One hundred-ten (110) ppm, corrected to fifteen percent (15%) oxygen, for combustion turbines firing distillate oil or diesel fuel.
- (D) No owner or operator of a stationary internal combustion engine with a rated maximum heat input capacity greater than twenty (20) mmBtu per hour shall allow or permit the discharge of NO_x emissions in excess of the following limits:
1. For rich burn engines which burn only gaseous fuels—
 - A. nine and one-half (9.5) grams per horsepower-hour for engines which are rated equal to or greater than five hundred (500) horsepower and less than one thousand (1,000) horsepower; or
 - B. two and one-half (2.5) grams per horsepower-hour for engines which are rated equal to or greater than one thousand (1,000) horsepower;
 2. For lean burn engines which burn only gaseous fuels—
 - A. ten (10.0) grams per horsepower-hour for engines which are rated equal to or greater than five hundred (500) horsepower and less than one thousand (1,000) horsepower; or
 - B. three (3.0) grams per horsepower-hour for engines which are rated equal to or greater than one thousand (1,000) horsepower;
 3. For engines which burn only diesel fuel or distillate oil—

- A. eight and one-half (8.5) grams per horsepower-hour for engines which are rated equal to or greater than five hundred (500) horsepower and less than one thousand eight hundred (1,800) horsepower; or
 - B. two and one-half (2.5) grams per horsepower-hour for engines which are rated equal to or greater than one thousand eight hundred (1,800) horsepower; or
- 4. For engines which burn dual fuels—
 - A. six (6.0) grams per horsepower-hour for engines which are rated equal to or greater than five hundred (500) horsepower and less than two thousand (2000) horsepower; or
 - B. two and one-half (2.5) grams per horsepower-hour for engines which are rated equal to or greater than two thousand (2,000) horsepower.
- (E) No owner or operator of a regenerative container glass melting furnace shall allow the unit to emit NO_x in excess of 5.5 pounds of NO_x per ton of glass pulled.
- (F) No owner or operator of a portland cement kiln shall allow the unit to operate unless good combustion practices are implemented. Each portland cement kiln shall develop a good combustion practice plan that identifies appropriate kiln operating parameters necessary to ensure minimum NO_x formation. Each kiln operator shall be trained to operate the kiln in accordance with the plan. The parameters included in the plan shall include at a minimum the following:
 - 1. Kiln exit oxygen operating range or a surrogate parameter;
 - 2. Clinker burning zone temperature operating range or a surrogate parameter; and

3. Monitoring and record keeping procedures for each parameter.

(G) Emissions Averaging. An owner or operator may comply with the requirements of subsections (3)(A), (3)(C), (3)(D), (3)(E) and (3)(H) of this rule by averaging between two (2) or more similar emission units provided they are located in the St. Louis ozone nonattainment area and provided that both units are required to comply with the subsections (3)(A), (3)(C), (3)(D), (3)(E) or (3)(H) of this rule.

1. Compliance shall be based on the weighted average of actual NO_x emissions from the units on a monthly basis. The averaged emissions rate for the units must be equal to or less than the allowable emissions rate for the units as defined in this rule. An owner or operator who elects to comply with an average NO_x emission limit shall use the following equation to determine compliance:

$$\sum(\text{actual NO}_x \text{ emission rate from each unit}) * \text{actual monthly heat input from each unit} \leq \sum(\text{allowable NO}_x \text{ emission rate from each unit} * \text{actual monthly heat input from each unit}); \text{ or}$$

2. NO_x emission rates shall be calculated from actual data from CEMS, PEMS or established through stack testing at several loads.
3. NO_x emissions averaging may only occur between emission units operated under the same owner unless a binding legal agreement between two (2) owners is filed with the director and provided the emission units are located in the St. Louis ozone nonattainment area. The binding legal agreement must specify the following:
 - A. A commitment between the two (2) owners or operators to comply with the averaging provisions;

- B. Identification of the emission units which will be used for averaging;
- C. An outline of how the emission units will comply with the averaging provisions;
- D. A schedule for submitting the monthly data used to determine compliance with the averaging provisions; and
- E. Contacts from each owner or operator who will be responsible for the monthly compliance reports.

(H) Case-By-Case RACT Studies.

- 1. The owner or operator of an emissions unit subject to this rule but not specifically identified in subsection (3)(A), (3)(B), (3)(C), (3)(D), (3)(E) or (3)(F) of this rule shall conduct and submit by July 1, 2000 a detailed engineering and RACT study for those emission units subject to this rule.
- 2. Each RACT proposal shall, at a minimum, include the following information:
 - A. A list of emission units subject to the RACT requirements;
 - B. The size or capacity of each affected emission unit and the types of fuel combusted or the types and quantities of materials processed or produced by each emission unit;
 - C. A physical description of each emission unit and its operating characteristics;
 - D. Estimates of the potential and actual NO_x emissions from each affected emission unit and associated supporting documentation;
 - E. A RACT analysis which meets the requirements of subsection (3)(A) of this rule, including

technical and economic support documentation identified in subsection (3)(G) of this rule for each affected emission unit;

- F. A schedule for completing implementation of the RACT proposal as expeditiously as practicable but not later than April 1, 2001, including interim dates for the issuance of purchase orders, start and completion of process technology and control technology changes and the completion of compliance testing;
 - G. Testing, monitoring, recordkeeping and reporting procedures proposed to demonstrate compliance with RACT;
 - H. An application for an operating permit amendment or application to incorporate the provisions of the RACT proposal; and
 - I. Additional information requested by the department that is necessary for the evaluation of the RACT proposal.
3. In addition, the RACT analysis required under subsection (3)(F) of this rule shall include:
- A. A ranking of the available control options for the affected emission unit in descending order of control effectiveness. Available control options are air pollution control technologies or techniques with a reasonable potential for application to the emission unit. Air pollution control technologies and techniques include the application of production process or methods and control systems for NO_x. The control technologies and techniques shall include existing controls for the source category and technology transfer controls applied to similar source categories;

- B. An evaluation of the technical feasibility of the available control options as required by paragraph (3)(G)1. of this rule. The evaluation of technical feasibility shall be based on physical, chemical and engineering principles. If an analysis is determined to be technically infeasible, the technical difficulties which would preclude the successful use of the control options on the affected emission unit shall be identified;

- C. A ranking of the technically feasible control options in order of overall control effectiveness for NO_x emissions. The list shall present the array of control options and shall include, at a minimum, the following information:
 - (I). The baseline emissions of NO_x before implementation of each control option;

 - (II). The estimated emission reduction potential or the estimated control efficiency of each control option;

 - (III). The estimated emissions after the application of each control option; and

 - (IV). The economic impacts of each control option, including both overall cost effectiveness and incremental cost effectiveness; and

- D. An evaluation of cost effectiveness of each control option consistent with "OAQPS Control Cost Manual" (Fourth Edition), EPA 450/3-90-006 January 1990 and subsequent revisions. The evaluation shall be conducted in accordance with the following requirements:

- (I). The cost effectiveness shall be evaluated in terms of dollars per ton of NO_x emission reduction;
- (II). The cost effectiveness shall be calculated on average and incremental bases for each option. Average cost effectiveness is calculated as the annualized cost of the control option divided by the baseline emissions rate minus the control option emission rate, as shown by the following formula:

Cost Effectiveness Equation

$$\frac{\text{Average Cost Effectiveness (\$/ton NO}_x \text{ removed)} = \frac{\text{Total annualized cost of the control option (\$/yr)}}{\text{Baseline emission rate (tons/yr) - Control option emission rate (tons/yr)}}$$

- (III). For purposes of this paragraph, baseline emission rate represents the maximum emissions before the implementation of the control option. The baseline emissions rate shall be established using either test results or approved emission factors and historical operating data; and
- (IV). For purposes of this paragraph, the incremental cost effectiveness calculation compares the costs and emission level of a control option to those of the next most stringent option, as shown by the following formula:

Incremental Cost Equation

$$\text{Incremental Cost per incremental ton removed (\$/ton)} = \frac{\text{Total annualized cost for a control option (\$/yr) - Total annualized cost for the next most stringent control option (\$/yr)}}{\text{The emission rate for the more stringent control option (tons/yr) - The emission rate for the control option (tons/yr)}}$$

4. Based upon this study, the director shall provide a case-specific RACT determination which shall be implemented by the owner or operator of the unit as expeditiously as practicable but in no case later than May 1, 2002. This case-specific RACT determination shall be submitted to the administrator of the U.S. Environmental Protection Agency.

- (I) Any unit during periods of start up, shutdown, or malfunction shall comply with the requirements of 10 CSR 10-6.050.

(4) Reporting and Record Keeping.

- (A) Reporting. Reporting shall be based on the test methods identified in section (5) of this rule.

1. The owner or operator of an emissions unit subject to subsections (3)(A), (3)(C), (3)(D), (3)(E), (3)(F) and (3)(G) of this rule shall comply with the following requirements:
 - A. Submit for each NO_x emissions unit that uses a CEMS to demonstrate compliance, an annual report containing the date, time and emissions rate in pounds NO_x per mmBtu of all thirty (30)-day rolling averages greater than the emission rates allowed under section (3) of this rule;
 - B. Submit for each NO_x emissions unit which uses stack tests to demonstrate compliance, an annual report identifying monthly fuel usage and monthly total heat input; and
 - C. Submit a written report of all stack tests completed after controls are effective to the director within sixty (60) days after completion of sample and data collection.
2. The owner or operator of an emissions unit subject to subsection (3)(H) of this rule shall comply

with the reporting requirements established in the case-by-case RACT determination approved by the director. The owners or operators of emissions units complying with the averaging provisions of subsection (3)(H) shall submit to the director within thirty (30) days after the end of each calendar month a compliance report stating the averaged emission rate. The compliance report shall also include the data used to determine the averaged emission rate. If the average emission rate exceeds the allowable emission rate, the owners and operators shall determine which owner or operator is responsible for the violation. The owners and operators in the compliance report shall submit the identity of the responsible owner or operator. The department will take enforcement action against only the owner or operator responsible for the violation. However, if the owners or operators do not submit within thirty (30) days the identity of the violator, both owners or operators shall be responsible for the violation.

(B) Record Keeping.

1. Each owner or operator of an emissions unit subject to subsections (3)(A), (3)(C), (3)(D), (3)(E), (3)(F) and (3)(G) of this rule shall maintain records of the following:
 - A. Total fuel consumed on a monthly basis unless the unit is operating a CEMS or predictive emissions monitoring system (PEMS);
 - B. The total heat input for each emissions unit on a monthly basis unless the unit is operating a CEMS or a PEMS;
 - C. Reports of all stack testing conducted to meet the requirements of this rule;
 - D. All other data collected by a CEMS or a PEMS necessary to convert the monitoring data to

the units of the applicable emission limitation;

- E. If a CEMS is used, all performance evaluations conducted in the past year;
 - F. All CEMS or monitoring device calibration checks;
 - G. All monitoring system, monitoring device and performance testing measurements;
 - H. Records of adjustments and maintenance performed on monitoring systems and devices; and
 - I. A log identifying each period during which the CEMS was inoperative, except for zero and span checks, and the nature of the repairs and adjustments performed to make the system operative.
- 2. The owner or operator of an emissions unit subject to subsection (3)(H) of this rule shall comply with the recordkeeping requirements established in the case-by-case RACT determination approved by the director.
 - 3. All records must be kept on site for a period of five (5) years and made available to the department upon request.

(5) Test Methods.

- (A) Compliance testing. Initial compliance for all units subject to subsections (3)(A), (3)(C), (3)(D), (3)(E) or (3)(G) of this rule shall be determined through a stack test performed prior to the implementation date under section (1) of this rule except those units complying with the provisions of subsection (5)(B) of this rule. After the initial stack test, stack tests shall be required every three (3) years to determine compliance except for units complying with the

provisions of subsection (5)(B) of this rule. The following test methods shall be used for all stack tests:

1. 40 CFR Part 60 Appendix A, Method 7, 7A, 7C, 7D or 7E shall be used to determine NO_x concentrations in stack gases;
2. 40 CFR Part 60 Appendix A, Method 1A, 2, 2A, 2B, 2C, 2D, 2F, 2G, or 2H shall be used to determine the exit velocity of stack gases;
3. 40 CFR Part 60 Appendix A, Method 3 or 3A shall be used to determine carbon dioxide, oxygen, excess air and molecular weight of stack gases;
4. 40 CFR Part 60 Appendix A, Method 4 shall be used to determine moisture content of stack gases from applicable stationary sources; or
5. 40 CFR Part 60 Appendix A, Method 20 may be used to determine NO_x concentrations for stationary combustion turbines.

(B) Monitoring. As an alternative to the compliance testing required under subsection (5)(A) for units subject to subsections (3)(A), (3)(C), (3)(D), (3)(E) and (3)(G) of this rule, an owner or operator of an emission unit may install, calibrate, maintain and operate a CEMS or a PEMS approved by the Director and the U.S. Environmental Protection Agency (EPA), or use an equivalent procedure for measuring or estimating NO_x emissions approved by the Director and the EPA. For units operating CEMS, PEMS or an equivalent procedure for estimating NO_x emissions, the following requirements shall apply:

1. Compliance shall be measured on a thirty (30)-day rolling average;
2. All valid data shall be used for calculating NO_x emissions rates;

3. The procedures under 40 CFR 60.13(d), (e) and (f) and 40 CFR Part 60 Appendix B, Performance Specification 2 shall be followed, or other procedures approved by the director; for the installation, evaluation and operation of CEMS or PEMS; and
4. Quarterly accuracy and daily calibration drift tests shall be performed in accordance with 40 CFR Part 60 Appendix F, or other tests approved by the director.
5. CEMS installed, certified and operated in accordance with 40 CFR Part 75 are deemed to be approved by the Director to meet the monitoring and quality assurance requirements of this subsection.

EPA Rulemakings

FRM: 65 FR 31482 (5/18/00)

State Submission: 11/12/99

APDB File: MO-131

[illegible]

None.